IT IS CLAIMED:

1. A method for improving packet performance in an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system and a current time reference source, the access network including at least one downstream channel used by the Head End to communicate with a first plurality of the network nodes, and at least one shared-access upstream channel used by the first plurality of nodes to communicate with the Head End, the access control system including a MAP generating device for generating MAP messages of future slot allocations on the at least one upstream channel, each MAP message specifying a specific, future allocation start time (SAT) for that particular MAP message, the SAT for each MAP message being determined by adding a Lookahead Time (LAT) value to a current time value obtained while the MAP message is being generated, the method comprising:

obtaining propagation delay data associated with at least a portion of the plurality of nodes using the at least one upstream channel, the propagation delay data for a node being obtained from ranging procedures performed between the access control system and the node; and

dynamically adjusting the Lookahead Time value associated with the generating of MAP messages for the at least one upstream channel using the propagation delay data.

2. The method of claim 1 further comprising determining a minimum propagation delay value corresponding to a farthest on-line node on the at least one upstream channel;

wherein the dynamic adjustment of the Lookahead Time value includes calculating the Lookahead Time value using the minimum propagation delay value.

3. The method of claim 2 wherein said minimum propagation delay value is a maximum runtime propagation delay value of said propagation delay data for the at least one upstream channel.

4. The method of claim 2 wherein the Lookahead Time (LAT) value is calculated by adding together a plurality of delay aspects of the network, said plurality of delay aspects including:

a MAP construction delay at the Head End;

an interleaver delay;

the minimum propagation delay, expressed in terms of a round-trip delay;

and a MAP processing delay at a network node.

5. The method of claim 2 further comprising:

determining a first propagation delay value associated with a first node on the at least one upstream channel;

comparing the first propagation delay value to a stored propagation delay value; and

if the first propagation delay value is greater than the stored propagation delay value, replacing the stored propagation delay value with the first propagation delay value.

6. The method of claim 2 wherein determining the minimum propagation delay value comprises:

determining a respective propagation delay value for each node on the at least one upstream channel which initiates a ranging procedure with the control access system;

comparing each of the propagation delay values in order to determine a largest propagation delay value; and

assigning the largest propagation delay value as the minimum propagation delay value for the at least one upstream channel.

7. The method of claim 1 wherein said access network is a cable network, said plurality of nodes are cable modems, wherein said access control system is a Cable Modem Termination System (CMTS), and wherein said propagation delay data corresponds to offset data obtained during ranging procedures between a cable modem and the CMTS.

8. The method of claim 1 wherein said access network is a wireless network.

9. The method of claim 1 wherein said ranging procedure is an initial ranging procedure performed between the node and the access control system.

10. The method of claim 1 wherein said ranging procedure is a periodic ranging procedure performed between the node and the access control system.

11. The method of claim 6 further comprising storing the propagation delay data associated with each on-line modem on the at least one upstream channel in a data structure at the Head End.

12. The method of claim 11 further comprising re-calculating the minimum propagation delay value using at least a portion of the stored propagation delay values, wherein the re-calculation of the minimum propagation delay value is triggered by an occurrence of an event.

13. The method of claim 12 wherein said event is a farthest on-line node on the at least one upstream channel switching to a different upstream channel.

14. The method of claim 12 wherein said event is a farthest on-line node on the at least one upstream channel going off-line.

15. The method of claim 1 further comprising:

determining a minimum propagation delay value corresponding to a farthest on-line node on the at least one upstream channel;

calculating a minimum Lookahead Time value using the minimum propagation delay value; and

using said minimum Lookahead Time value for generating channel MAP messages which do not include initial ranging slot allocations.

16. The method of claim 15 further comprising:

calculating a second Lookahead Time value using a maximum propagation delay value, said different propagation delay value being based upon a maximum allowed distance between a node and the Head End of the access network; and

using said second Lookahead Time value for generating channel MAP messages which include at least one initial ranging slot.

17. A Head End of an access network, the access network comprising a plurality of nodes, the access network including at least one downstream channel used by the Head End to communicate with a first plurality of the network nodes, and at least one shared-access upstream channel used by the first plurality of nodes to communicate with the Head End, the Head End comprising:

a source providing a current time reference; and

a MAP generating device configured or designed to generate MAP messages of future slot allocations on the at least one upstream channel, each MAP message specifying a specific, future allocation start time (SAT) for that particular MAP message;

the Head End being configured or designed to determine the SAT for each MAP message by adding a Lookahead Time (LAT) value to a current time value obtained while the MAP message is being generated;

the Head End being further configured or designed to obtain propagation delay data associated with at least a portion of the plurality of nodes using the at least one upstream channel, the propagation delay data for a node being obtained from ranging procedures performed between the Head End and the node;

the Head End being further configured or designed to use the propagation delay data to dynamically adjust the Lookahead Time value associated with the generating of MAP messages for the at least one upstream channel.

18. The Head End of claim 17, wherein the Head End is further configured or designed to determine a minimum propagation delay value corresponding to a farthest on-line node on the at least one upstream channel; and

wherein the Head End is further configured or designed to calculate the Lookahead Time value using the minimum propagation delay value.

19. The Head End of claim 18 wherein said minimum propagation delay value is a maximum runtime propagation delay value of said propagation delay data for the at least one upstream channel.

20. The Head End of claim 17 wherein the Head End further includes memory configured to store a minimum propagation delay value corresponding to a farthest on-line node on the at least one upstream channel.

21. The Head End of claim 20 wherein said memory is further configured to store an optimized LAT value, said optimized LAT value being derived from said minimum propagation delay value.

22. The Head End of claim 18, wherein said Head End is further configured or designed to:

determine a first propagation delay value associated with a first node on the at least one upstream channel;

compare the first propagation delay value to a stored propagation delay value; and

replace the stored propagation delay value with the first propagation delay value, if the first propagation delay value is greater than the stored propagation delay value.

23. The Head End of claim 18 wherein said Head End is further configured or designed to:

determine a respective propagation delay value for each node on the at least one upstream channel which initiates a range procedure with the control access system;

compare each of the propagation delay values in order to determine a largest propagation delay value; and

assign the largest propagation delay value as the minimum propagation delay value for the at least one upstream channel.

24. The Head End of claim 17 wherein said access network is a cable network, said plurality of nodes are cable modems, wherein said Head End includes a Cable

Modem Termination System (CMTS), and wherein said propagation delay data corresponds to offset data obtained during ranging procedures between a cable modem and the CMTS.

25. The Head End of claim 17 wherein said access network is a wireless network.

26. The Head End of claim 17 wherein said ranging procedure is an initial ranging procedure performed between the node and the Head End.

27. The Head End of claim 17 wherein said ranging procedure is a periodic ranging procedure performed between the node and the Head End.

28. The Head End of claim 23, wherein the Head End is further configured or designed to store the propagation delay data associated with each on-line modem on the at least one upstream channel in a data structure at the Head End.

29. The Head End of claim 28, wherein the Head End is further configured or designed to re-calculate the minimum propagation delay value using at least a portion of the stored propagation delay values in response to a detection of an event occurrence.

30. The Head End of claim 29 wherein said event is a farthest on-line node on the at least one upstream channel switching to a different upstream channel.

31. The Head End of claim 29 wherein said event is a farthest on-line node on the at least one upstream channel going off-line.

32. The Head End of claim 17 wherein the Head End is further configured or designed to determine a minimum propagation delay value corresponding to a farthest on-line node on the at least one upstream channel, and calculate a minimum Lookahead Time value using the minimum propagation delay value; and

wherein the MAP generating device is further configured or designed to use said minimum Lookahead Time value for generating channel MAP messages which do not include initial ranging slot allocations.

33. The Head End of claim 32 wherein the Head End is further configured or designed to calculate a second Lookahead Time value using a maximum propagation delay value, said maximum propagation delay value being based upon a maximum allowed distance between a node on the at least one upstream channel and the Head End of the access network; and

wherein the MAP generating device is further configured or designed to use said second Lookahead Time value for generating channel MAP messages which include at least one initial ranging slot.

34. A computer program product for improving performance of an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system and a current time reference source, the access network including at least one downstream channel used by the Head End to communicate with a first plurality of the network nodes, and at least one shared-access upstream channel used by the first plurality of nodes to communicate with the Head End, the access control system including a MAP generating device for generating MAP messages of future slot allocations on the at least one upstream channel, each MAP message specifying a specific, future allocation start time (SAT) for that particular MAP message, the SAT for each MAP message being determined by adding a Lookahead Time (LAT) value to a current time value obtained while the MAP message is being generated, the computer program product comprising:

a computer usable medium having computer readable code embodied therein, the computer readable code comprising:

computer code for obtaining propagation delay data associated with at least a portion of the plurality of nodes using the at least one upstream channel, the propagation delay data for a node being obtained from ranging procedures performed between the access control system and the node; and

computer code for dynamically adjusting the Lookahead Time value associated with the generating of MAP messages for the at least one upstream channel using the propagation delay data.

35. The computer program product of claim 34 further comprising computer code for determining a minimum propagation delay value corresponding to a farthest on-line node on the at least one upstream channel, wherein the dynamic adjustment of the Lookahead Time value includes calculating the Lookahead Time value using the minimum propagation delay value.

36. The computer program product of claim 35 wherein the computer code for determining the minimum propagation delay value comprises:

computer code for determining a respective propagation delay value for each node on the at least one upstream channel which initiates a ranging procedure with the control access system;

computer code for comparing each of the propagation delay values in order to determine a largest propagation delay value; and

computer code for assigning the largest propagation delay value as the minimum propagation delay value for the at least one upstream channel.

37. The computer program product of claim 34 wherein said access network is a cable network, said plurality of nodes are cable modems, wherein said access control system is a Cable Modem Termination System (CMTS), and wherein said propagation delay data corresponds to offset data obtained during ranging procedures between a cable modem and the CMTS.

38. The computer program product of claim 34 wherein said access network is a wireless network.

39. The computer program product of claim 36 further comprising computer code for storing the propagation delay data associated with each on-line modem on the at least one upstream channel in a data structure at the Head End.

40. The computer program product of claim 39 further comprising computer code for re-calculating the minimum propagation delay value using at least a portion of the stored propagation delay values, wherein the re-calculation of the minimum propagation delay value is triggered by an occurrence of an event.

41. The computer program product of claim 34 further comprising:

computer code for determining a minimum propagation delay value corresponding to a farthest on-line node on the at least one upstream channel;

computer code for calculating a minimum Lookahead Time value using the minimum propagation delay value; and

computer code for using said minimum Lookahead Time value for generating channel MAP messages which do not include initial ranging slot allocations.

42. The computer program product of claim 41 further comprising:

computer code for calculating a second Lookahead Time value using a maximum propagation delay value, said maximum propagation delay value being based upon a maximum allowed distance between a node and the Head End of the access network; and

computer code for using said second Lookahead Time value for generating channel MAP messages which include at least one initial ranging slot.